

**BENCHTEST**

# SORD M5

*Sord's entry into the full-colour sub-£200 sector of the home computer market is something of an enigma. On the one hand, its user memory could charitably be described as meagre—but, to compensate, there's a full 16k of video RAM giving superb sprite graphics. Steve Mann puts the Japanese challenger through its paces.*



Photography by Ian McKinnell



This review nearly turned out very differently. Micro magazines have recently been full of dire warnings of an impending Japanese invasion, but at first sight the vanguard of the invading forces, Sord's M5, appeared to indicate that there was nothing to worry about. A £190 computer with integer-only Basic and with just 3k or so of RAM available to the user — how could that possibly pose any sort of threat to the Spectrums and Orics we have come to know and love? I was all set to put the boot in. Reading through the introductory manual only confirmed my suspicions — it was full of mistakes and, among other howlers, contained absolutely no mention of how one was supposed to use the sound facilities, even though Sord proudly trumpeted 'three chords, one noise, seven special sounds' in the setting-up booklet.

So, pen dipped in vitriol, I was all set to put the upstart in its place. Then I was loaned a Basic-G cartridge to try out for a couple of days — and my opinion changed rapidly. With Basic-G in place, the M5 was a different machine. I had no time to give the extra facilities any more than a cursory examination, but it soon became clear that

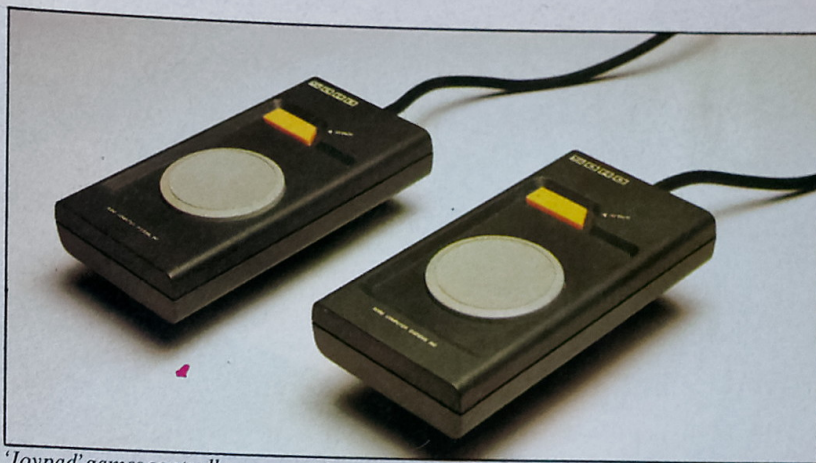
Sord has come up with a very neat and clever machine indeed. However, to get full value from the M5, considerably more than the basic package of computer and Basic-I cartridge is required: extra cartridges are needed to use the graphics and sound facilities and to reap the benefits of full floating-point mathematics. This is going to add considerably to the price and could be a major stumbling-block to wide acceptance.

The Sord is not a cheap machine, even in its basic configuration, and for any serious application the user is going to have to fork out around £225.

## Hardware

The M5 comes in a Spectrum-style case measuring 262 x 185 x 36mm, and weighs in at 1kg. It is finished in two shades of grey, with yellow and white lettering, and has a 55-key touch-sensitive keyboard. At the rear are sockets for cassette, printer, two 'joypad' games controllers and output for a standard TV or composite video. In addition, there's a lift-up lid which allows access to a socket for the various plug-in cartridges. The whole thing is manufactured to a high standard and seems satisfyingly robust.

Sord obviously does not expect users to poke around inside. Getting at the internals appears impossible without tearing



'Joypad' games controllers

the ribbon cable that connects the keyboard, but levering up the front and squinting inside reveals a well constructed and neat PCB, with no obvious 'kludges' or last-minute changes of mind.

The Z80A runs at 3.58 MHz and there is 8k of onboard ROM (expandable to 16k via expansion cartridge) and 20k of RAM. Of this 20k, 16k is needed to handle the display and about 1k is used to handle various system chores — so the user is left with about 3k only for programs. Inserting the Basic-G cartridge adds another 4k, but this is still very limited in comparison with other machines in the same price range and may well be a big drawback as far as sales are concerned. But then again, limited memory does not seem to have done the VIC-20's sales any harm!

The keyboard is reminiscent of the Spectrum's but has a much better feel to it. The keys are rectangular, with a small piece cut out of the bottom left hand corner, and are positive in action; there is a satisfying click as the Sord accepts input. Characters and keywords are detailed in yellow and white, but some of the yellow letters are extremely hard to pick out on the dark grey background. The key positions take a bit of getting used to as well — I found myself getting confused between the RETURN and SPACE keys and the CTRL and FUNCTION ones. There are 64 graphics characters — 32 of which are represented on the keys and the other 32 are accessed via the SHIFT key. The separate power supply is switched (other manufacturers please copy) and a red LED on the keyboard indicates when power is on.

## Basic-I

The Sord M5 cannot function without a ROM cartridge in place so, before switching on, the lid above the keyboard must be raised and a cartridge slotted in. The lid appears somewhat flimsy at first sight, but in fact is cunningly designed to come off if undue force is exerted.

Basic-I is the cartridge supplied with the M5. I assume the 'I' stands for 'Intro-

tion' as this is a very simplified and limited dialect.

It is integer-only, and calculations are restricted to the range -32767 to 32767. This limit applies even in the middle of calculations that result in an in-range figure. So, for example, PRINT 2000\*50/100 gives an overflow error message, while PRINT 2000/10\*50 is okay. The manual does not make this clear — it warns that the final result must be in range but says nothing about intermediate steps.

The Basic seems to be fairly standard Microsoft-style, but the restrictions against using embedded keywords that are present in many dialects thankfully do not apply to the Sord. Variable names can be up to 16 characters in length, and LET is optional. Upper case and lower case are totally interchangeable — 'TOTAL' is the same variable as 'total', and 'run' or 'RUN' are equally permissible. The M5 automatically inserts spaces into listings; the only one that is compulsory is the space after a keyword. This is a very nice touch — there's nothing more offputting for the beginner than to have his/her program continually hang up because of missing spaces in input lines.

For a Basic that is obviously designed for the beginner, though, the manual does not do its job very well. The mistakes begin in the first section, where the manual insists that the cursor is a letter 'A' whereas it is, in fact, 'L', 'C' or 'G' depending on the mode selected. The manual writer also seems to have trouble distinguishing between colons and semi-colons — the former are referred to as semi-colons on numerous occasions. The instructions for the DELETE command are also given wrongly, with a full stop shown instead of a comma. These are all relatively minor points, but one which could give the beginner some problems. It's not inconceivable that a newcomer, on seeing the letter 'L' instead of an 'A' as the cursor, could think that his new computer is malfunctioning and return it to the shop. Sord needs to revamp the manual with some urgency: it is imperative that an instruction booklet for the computer novice should be as complete



# SORD M5



Hinged lid lifts off to allow insertion of cartridges



All sockets are clearly marked

and error-free as possible.

Basic-I supports simple graphics; these are accessed by pressing the FUNCTION key together with numeral 3. Basic-I does have some sophisticated commands for such a limited dialect: facilities such as automatic line numbering are supported, and the FRE function takes several parameters, detailing amount of memory used and amount of memory remaining. Various control codes are used for changing screen modes, cursor movement and — particularly useful — scrolling the screen. Most computers require special routines to scroll the screen sideways; with the Sord this is accomplished simply by inserting the relevant control codes in PRINT statements. A complete list of control codes is given in Table 1. Basic-I commands and functions are detailed in Table 2. In normal operation Basic commands are entered one letter at a time, but by using the FUNCTION key plus the initial letter of

each command they can be entered Sinclair-style — ie, FUNCTION plus 'P' gives PRINT.

## Basic-G

The Basic-G cartridge is sold as an optional extra at just under £35 but is really an essential purchase as the full power of the M5's graphics, and sound cannot be realised without it. Basic-I is essentially a limited subset of Basic-G and all the facilities mentioned in the Basic-I review above are present in the G version.

With Basic-G in residence, the Sord becomes a remarkably flexible and powerful machine. The facilities offered are quite astounding for a small personal computer and, of course, the sprite capabilities and 16k video RAM make the M5 a superb games machine.

There are four screen modes: text, which gives 24 lines of 40 columns, with

characters defined on an 8x6 grid; GI, which gives 24 lines of 32 columns and all the keyboard graphic characters; multi-colour (or, as Sord insists, 'multi-color'), which allows you a limited mosaic graphic capability with a 4 x 4 pixel block, giving 64 x 48 distinct locations; and GII, the full sprite graphic mode. GII allows up to 32 moving sprites to be defined, with a 16-colour static background and a 'back-light plane' which can also be coloured in any one of 16 shades.

The M5 also features two alternate screens, named 'screen 0' and 'screen 1'. Of course, as a TV can display one screen only, one screen is always hidden from view. Use of various control codes enables the user to flip from one screen to another, and it is also possible to have one screen on view while you input text or information to the hidden screen. Each screen can be set up in a different mode (with the exception of GII and multi-colour). And that's not all ... in every mode except GII you can use 'expanded screen buffers' which, says the manual, 'can be envisaged as eight extra-screen buffers added to the two display screens'. These provide a very quick and simple way of animating characters — if a character is displayed on the various screen buffers in a slightly different position on each, the illusion of motion is achieved by flipping through the screens in the same way as flicking the pages of an animated cartoon book. Any of the 224 displayable characters can be user defined by means of the STCHR command so, even without sprites, some very classy animated graphics can be achieved.



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But it's with the sprites that the M5 really comes into its own. The M5 has 32 sprite planes, the background plane and the backlight plane. A background is set up on the 256 x 192 resolution background plane and up to 32 sprites can move individually, each on their own plane. Sprites can be as small as an eight pixel by eight pixel matrix or as large as four 16 x 16 matrices. They can be joined up or split apart at will and, because positioning is determined by pixel position, movement is extremely smooth and impressive.

Sprites are assigned 'sprite codes' with the SCOD statement, are coloured with SCOL and are displayed with LOC (for 'location'). They are numbered hierarchically from 0 to 31, with 0 as the highest level. A higher level sprite will hide a lower level one — so if sprite 0 passes over sprite 5 and they are both the same size, sprite 5 will be hidden. It is also possible to set up screen windows or 'viewports'. To erase a sprite, you simply need the command ERASE together with the relevant sprite number. So setting up moving graphics on the M5 is very easy — and the results are extremely impressive. In fact, for any application involving moving graphics, the limited memory of the M5 is hardly a problem — on most other computers setting up the screen and feeding in the graphics code is going to use a large amount of memory. On the Sord all the hard work is handled for you and the constant 16k video RAM means that you do not have to 'steal' memory from the user RAM in high-resolution modes.

While your sprites are busily dashing around the screen, the background can be set up in detail. The M5's CIRCLE statement will draw circles (surprise, surprise!), polygons, ellipses, arcs or fans (very useful for pie charts) by simply changing the parameters; there is a BOX statement for drawing squares and rectangles; the BAR statement for displaying solid rectangles; and PAINT for filling an enclosed area with colour. Using graphics, a single pixel may be coloured in any one of 16 shades by using the FCOL statement, but as on the Spectrum a character may contain at most two colours. To display a character on a graphics screen it is simply necessary to add '#1' to a PRINT statement. This is, of necessity, a brief

No colour (transparent)	Light red
Black	Dark yellow
Green	Light yellow
Light green	Dark green
Dark blue	Purple
Light blue	Grey
Dark red	White
Cyan	
Red	

Table 3 Colours

rundown only of the graphic capabilities of the M5 — a full exploration of the various effects would take considerably longer than the couple of days I was able to spend with the GII cartridge. Suffice it to say that the M5 makes professional graphic effects very simple for even the beginner to achieve.

One particularly impressive feature of Basic-G is its use of interrupts. Interrupts allow you to break off from a specified task to handle something different, then return to the main job in hand. Basic-G has six different statements to handle various interrupts. ON COINC GOSUB takes care of any collisions between sprites — whenever a collision occurs, the program branches to the relevant subroutine. ON EVENT GOSUB accesses the internal timer, which is set by the user. Each time the set timer period expires an interrupt is caused. There is also a built-in alarm timer that is useful for setting a single time limit. This is serviced by an ON ALARM GOSUB statement. ON KEY GOSUB and the delightfully named ON JOY GOSUB service interrupts from the keyboard and from the joypads. Finally, ON ERROR GOSUB enables a GOSUB statement to be called whenever an error occurs while drawing graphics pictures. Unlike the other interrupts, this one cannot be turned on and off by the user.

The M5's internal timer is extremely versatile. The TIMES\$ statement sets the clock time in the format TIMES\$ = "hh:mm:ss". WAIT suspends operation for the prescribed time; after this an interrupt is generated and the appropriate subroutine called. SLEEP is very similar, but instead of calling a subroutine it simply carries on with program execution after the prescribed period is exceeded.

There are also some more features for handling PRINT statements and screen formatting. MPRINT allows the user to separate a character and display different segments on different lines; and there are two statements — DIST and DRCT for calculating the distance between sprites.

Basic-G is almost overburdened with features — for example, there are four different LIST commands. These are the normal LIST, which displays all or part of a program listing on the screen or on the printer; LISTC, which is as LIST but which lists everything out in upper case; ELIST, which is the same as LIST but which clears the screen first; and ELISTC, which is as ELIST but with everything in caps. Although the M5 lacks REPEAT UNTIL and WHILE/WEND, IF...THEN...ELSE is supported and the use of labels as destination addresses for subroutines makes structuring of programs easier.

All in all, Basic-G is sufficiently sophisticated to handle just about any situation involving graphics and, although integer-only, combines ease of use with power and flexibility. For full floating-point capabil-

A	not used
B	return cursor to beginning of line
C	scroll screen display down
D	scroll screen display left
E	scroll screen display up
F	scroll screen display right
G	bell
H	backspace
I	tab cursor eight spaces
J	move cursor down one line
K	move cursor to home position
L	clear screen display
M	same as RETURN key
N	move cursor to beginning of next line
O	change to standard mode
P	change to insert mode
Q	change to multi-colour mode
R	change to GII graphics mode
S	change to GI graphics mode
T	return to text mode
U	change to visible screen
V	alternate between visible and invisible screens
W	same as RETURN key
X	delete characters to right of cursor
Y	alternates between visible and invisible screens
Z	writes input to alternate screen

Table 1 Control codes

AUTO	LOC
CLEAR	MAG
CLS	SCOD
CONT	SCOL
DEL	STCHR
LIST	VIEW
LIST #2	VPOKE
NEW	ASCII
RUN	CHRS
CHAIN	HEXS
DATA	INKEY\$
INPUT	LEFT\$
OLD	LEN
OUT	MID\$
PRINT	RIGHT\$
PRINT #2	VAL
READ	CURSOR
RESTORE	ERR
SAVE	ERRL
TAPE	ERRLS
VERIFY	PEEK
CALL	VPEEK
DIM	ABS
END	FRE
FOR...TO...STEP	INP
GOSUB	NUM\$
GOTO	RND
IF...THEN...ELSE	SGN
LET	TIME
NEXT	
POKE	
RANDOMIZE	
REM	
RETURN	
STOP	

Table 2 Basic-1 commands



# 512 x 512 GRAPHICS

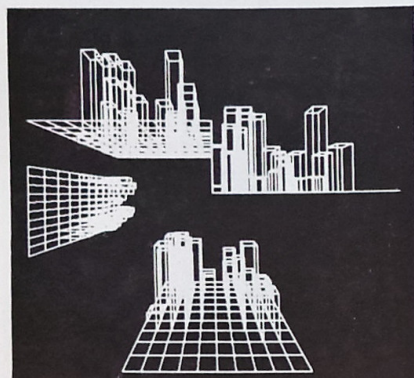
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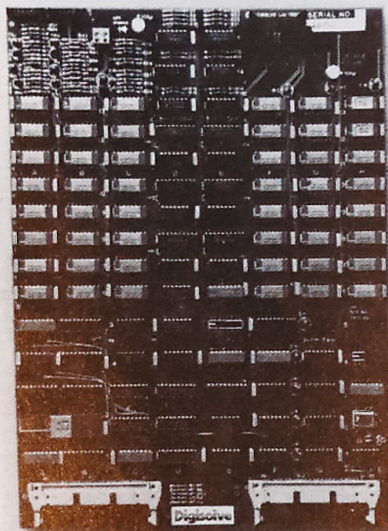
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# SORD M5

ity, the user will have to purchase the Basic-F cartridge.

## Sound

The Sord takes the sensible course of using music notation to program the sound generator — PLAY 'c' gives you, funnily enough, the note C. Sharps and flats are handled by suffixing the note letter with a plus or minus sign. The M5 provides up to six octaves and defaults to octave five, in which note C is middle C on a piano. To change octave it is simply necessary to insert a lower case 'o' and a number for the relevant octave. Note duration is specified by inserting a number without the letter 'o'; when first switched on the M5 plays quarter-notes. Dotted notes are dealt with by the simple expedient of inserting a full stop in the PLAY statement, and triplets are denoted (ouch!) by an exclamation mark. To continue with the logical approach, Sord has decided that rests should be indicated by use of the letter 'r'.

Up to three notes may be played simultaneously to create harmony — this is done by separating the notes in the PLAY statement with commas. Volume is set in the range 0-15 by including 'V' and the relevant number at the beginning of the PLAY statement (volume is set at maximum on switch-on) and tempo is indicated by the letter 'T' and a number in the range 1-255. There are eight different 'envelope' shapes for changing the sound of each note; these are set with 'S' and a number.

Of course, music is not the only use for the M5's sound capabilities — arcade-style effects are easily obtained by using the SG statement.

All in all, the M5's sound capabilities are more than adequate and the logical method of defining sounds and music means that even a complete novice should be able to achieve some good effects — a definite plus-point.

## Cassette

The M5 uses an ordinary cassette player for storage of programs and data, but once again Sord has done everything in its power to make things easy for the user.

The M5 uses an eight-pin DIN plug to connect to the user's tape machine and supports a 'remote' facility. Files are saved with SAVE "file name" or LIST "file name" and loaded with CHAIN "file name" or OLD "file name". SKIP can be used to 'skip over' files already on cassette, thus finding the first piece of blank tape. When programs are loaded back into the machine FIND "file name.BG" . . . is displayed, with the 'BG' suffix denoting Basic-G, or 'BI' if the file was saved under Basic-I. The dots after the file name and suffix give an approximate idea of the length of the file, with each dot representing 256 bytes. Programs can be verified,

and the whole operation seems very reliable. While I was reviewing this machine every program I tried saved and loaded first time and the M5 seems very tolerant of volume variations. It is also possible to save a screen — in this case VSAVE is used, but it should be noted that it's the alternate screen buffer that's saved, not the screen currently being displayed. So to save the displayed screen it is necessary to hit CTRL V and then type VSAVE: saving the screen takes about two minutes. When reloading a screen, care should be taken to ensure that the screen buffer is set to the mode the retrieved file expects — so when saving a screen it is advisable to note down the screen mode and screen buffer involved.

## Documentation

As mentioned above, the instruction manual for Basic-I leaves a lot to be desired. In contrast, the Basic-G manual is clearly written and, on the whole, accurate. In particular, the sections devoted to sprite graphics are very easy to follow and should make it easy for anyone to come up with some stunning graphics.

My only major quibble is the complete lack of information concerning memory addresses. I know it's possible to PEEK and POKE addresses in both user RAM and video RAM because these commands are mentioned in the manual glossary — but nowhere in the text does it tell you how to use these commands and what will happen if you do. CALL is also mentioned in passing as a means of executing assembler programs, but once again no further information is given. This is a serious omission as Basic-G is designed to be sufficiently powerful to attract the more advanced programmer who would want to use machine code.

But the manual certainly scores in the way it takes the user logically and carefully through the intricacies of Basic-G. It is well-written and thankfully is not subject to the mangling of the English language that was once almost compulsory for Japanese manuals.

## Expansion

The M5's design lends itself to expansion — the slot for various ROM cartridges means that other languages can be added

with the minimum of fuss. As yet, the company has released no details of forthcoming languages, but there is a 32k memory upgrade in the pipeline which will increase the machine's appeal considerably. There are also plans for a printer (the M5 has a built-in Centronics interface) and disk drives which, in combination with the FALC database and spreadsheet, could turn the M5 into a small business machine.

## Conclusions

The Sord M5 is not a cheap computer and is impeded by a somewhat limited memory. It is bound to suffer in comparison with machines like the Spectrum and Oric, which both offer 48k at a considerably cheaper price.

That said, it must be admitted that the M5 makes graphics programming extremely simple and allows some stunning effects to be achieved with the minimum of fuss. It will therefore appeal to the games programmer — although the lack of information about memory addresses is something that needs to be rectified to attract the machine code fanatic.

It is a pity that the M5 comes supplied with the Basic-I cartridge only. Although useful as an introduction to the complete beginner, Basic-I is not powerful enough to use the machine's capabilities to the full and I feel that Basic-G is a vital purchase. However, at £34.95, its purchase will put the price of the M5 up to nearly £225.

The M5 is beautifully designed and constructed; it definitely has the air of a 'quality' machine. If Sord would only include Basic-G in the basic package and knock fifty quid or so off the retail price, the M5 could well be a winner. As it stands at the moment, it is an attractive machine with much to recommend it — but unless the price comes down I don't envisage Sir Clive suffering too many sleepless nights . . .

## Prices

Sord M5 (with all leads, two games 'joypads' and Basic-I cartridge) £189.95

Extra ROM cartridges (Basic-G, Basic-F for floating-point arithmetic, FALC applications package) £34.95 each

END

## Technical specifications

Processor	Z80A running at 3.58 MHz
RAM	4k user memory, 16k video RAM
ROM	8k expandable to 16k via ROM cartridge
Keyboard	55 keys, membrane type
Screen	TV or monitor; four display modes, 16 colours
Sound	3 voice channels, 1 white noise, 7 'special sounds'
Interfaces	Tape (remote control), Centronics printer interface, composite video and sound.